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Title: SOIL SAMPLE PREPARATION

APPROVALS:

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SYNOPSIS: A standardized method for homogenization of surface soil samples is described. Protocols for sample preparation and handling are provided.

Received by QA Unit:

REVIEWS:

TEAM MEMBER	**SIGNATURE/TITLE**	**DATE**
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Revision Date	Reason for Revision
1/7/99	Incorporation of sieving to the sample preparation.
7/12/00	Revision in sieve size, other minor edits.

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide a standardized method for homogenizing surface soil samples. This procedure will be used by employees of USEPA Region 8 and by contractors/subcontractors supporting USEPA Region 8 projects and tasks. This SOP describes the equipment and operations used for homogenizing surface soil samples in a manner that will produce data that can be used to support risk evaluations. Site-specific deviations from the procedures outlined in this document must be approved by the USEPA Region 8 Remedial Project Manager, or Regional Toxicologist prior to initiation of the sampling activity.

2.0 RESPONSIBILITIES

The Field Project Leader (FPL) may be an USEPA employee or contractor who is responsible for overseeing the surface soil sampling activities. The FPL is also responsible for checking all work performed and verifying that the work satisfies the specific tasks outlined by this SOP and the Project Plan. It is the responsibility of the FPL to communicate with the Field Personnel regarding specific collection objectives and anticipated situations that require any deviation from the Project Plan. It is also the responsibility of the FPL to communicate the need for any deviations from the Project Plan with the appropriate USEPA Region 8 personnel (Remedial Project Manager, or Regional Toxicologist).

Field personnel performing surface soil sampling are responsible for adhering to the applicable tasks outlined in this procedure while homogenizing surface soil samples.

3. 0 EQUIPMENT

- General purpose laboratory oven - must be capable of maintaining a constant temperature of approximately 103-105°C**.**
- Sample drying trays - capable of holding an even layer of the complete sample volume of each sample. To minimize the decontamination effort, disposable drying trays are recommended.
- Analytical balance - accurate to 0.1 g, range of 0.1 g to 1000 g
- Riffle splitter - with 3/4 to 1 inch chutes to split samples
- Stainless steel or teflon scoop or spoon - for transferring samples
- 1-cm mesh stainless steel sieve and catch pan - for coarse sieving samples
- Collection containers - plastic ziplock bags.
- Gloves - for personal protection and to prevent cross-contamination of samples. May be plastic or latex. Disposable, powderless.

- Field clothing and Personal Protective Equipment - as specified in the Health and Safety Plan.

- Field notebook -used to record progress, any problems or observations.

- Permanent marking pen - used to label sample containers.

- Three-ring binder book - binders will contain Soil Preparation Sheets, Field Split Sample Log sheets, and sample labels.

- Trash Bag - used to dispose of gloves and wipes.

4.0 METHOD SUMMARY

Soil samples will be dried in a standard laboratory oven, then homogenized and split for subsequent analysis.

5.0 BULK SOIL DRYING

Set the oven temperature to 103-105 °C (not to exceed 115 °C). Establish the drying time by weighing a representative sample before drying, at estimated completion, and following an additional 15 minute drying time to confirm stable weight. Verify that the sample is completely dry using the "squeeze test", squeezing a portion of the sample between a freshly gloved thumb and forefinger. Sample dryness is indicated by a lack of cohesiveness in the soil.

Prior to drying each sample, record the weight on the Sample Preparation Logbook Sheet. Spread the sample on the drying tray in an even layer to promote even drying. Check the oven temperature to verify that proper temperature has been reached. Mark each tray with the sample ID number. Cover each sample with cheesecloth to minimize the potential for cross-sample contamination. Place the drying trays containing the samples in the oven. Leave the samples in the oven until completely dry. Verify that each sample is dry by testing cohesiveness using a freshly gloved thumb and forefinger. Record the weight after drying on the Sample Preparation Logbook Sheet. Document the sample drying time for each sample on the Soil Preparation Logbook Sheet (Attachment 1).

When samples are dry, remove from the oven area and place in the ventilation area. **Before placing samples in the ventilation area, verify that the hood is turned on.** A new pair of gloves must be worn for each sample.

The sample should be coarse sieved using a 1-cm screen. Pour the material which passed through the sieve into a new sample bag, and mark the outside of the bag with the sample ID. Gently knead contents of the bag to break up any remaining soil clumps. Completely seal the bag, then mix by turning the bag end-over-end slowly, for a minimum of ten times.

6.0 SAMPLE SPLITTING

Following the procedures outlined in Section 5.0, the soil sample should be well-homogenized. With the hood turned on, open the sample bag and use a clean and dry riffle splitter to split each sample.

The following method for splitting a soil sample was adapted from EPA 540-R-97-028 (USEPA, 1997). The sample is split by placing soil onto a splitter tray. Shake the tray to evenly distribute the sample. Place the long lip of the tray against the long lip of the splitter hopper and slowly rotate the tray so that the sample slowly empties into the splitter and slides down the near wall of the hopper to the chutes, collecting the sample in two receiving trays. Tap the sample tray vigorously several times to free any remaining material. Tap the splitter to facilitate the flow of all material through the chutes into the receiving trays. The corners and nooks of the splitter may be cleaned with a coarse nylon brush.

Pour the material from one of the receiving trays into a clean bucket and tap the tray vigorously to assure complete transfer. This portion is designated for archive. The original sample tray (which is now empty), and the emptied receiving tray should be placed under the splitter as the new receiving trays.

Repeat the process of dispersing the remaining sample material (containing half the mass of the original sample) by shaking the sample tray so that it is uniformly distributed. Repeat the procedure described above for splitting the sample. At the end of the second split, carefully transfer the material from each of the receiving trays into a clean, pre-weighed sample bag to be weighed and packaged for shipment to the laboratory and to W.R. Grace. Record each split sample ID, and the original sample ID on the Field Split Sample Log Sheet (Attachment 1).

7.0 FIELD DOCUMENTATION

Each sample ID must be recorded on the data sheets. Original sample ID numbers are recorded on the Soil Preparation Sheets, and the Field Split Sample Log sheets. When the original sample is split, the original sample ID number, and each new sample, must be recorded.

In addition, a field notebook should be maintained by each individual or team that is preparing samples. For each day that samples are processed, the following information should be collected:

- date
- time
- personnel
- weather conditions
- analytical balance calibration
- drying oven temperature
- descriptions of any deviations to the Project Plan and the reason for the deviation

Field personnel will prepare the proper type and quantity of quality control samples as prescribed in the Project Plan.

8.0 DECONTAMINATION

All non-dedicated equipment used during sample preparation must be decontaminated prior to use. It is recommended that disposable oven trays be used to minimize the decontamination effort. Stainless steel or teflon scoops or spoons, splitters, sieves and drying trays that will be re-used, must be decontaminated with de-ionized (DI) water and disposable wipes or towels. DI water is poured over the equipment, then wiped, then rinsed again with DI water. If soil particles are visible on any of the equipment, repeat this procedure until the equipment is clean. All equipment must be dry before it is re-used.

9.0 GLOSSARY

Project Plan - The written document that spells out the detailed site-specific procedures to be followed by the Project Leader and the Field Personnel.

10.0 REFERENCES

American Society for Testing and Materials. 1998. Standard Practice for Reducing Samples of Aggregate to Testing Size, ASTM Designation: C 702 - 98, 4 p.

USEPA. 1997. Superfund Method for the Determination of Releasable Asbestos in Soils and Bulk Materials. EPA 540-R-97-028.

ATTACHMENT 1